What is claimed is:

1. A thin film head comprising in combination: a reading part consisting of a magnetic shield layer and a reading element formed on a substrate; and a recording part consisting of a lower magnetic pole, an upper magnetic pole, coils, and a non-magnetic insulating layer; wherein said lower magnetic pole consists of a lower magnetic pole main layer, a lower magnetic pole front end portion, and a lower magnetic pole rear end portion; said upper magnetic pole has its front end portion opposite to the lower magnetic pole front end portion through a recording gap layer and its rear end portion connected magnetically to the lower magnetic pole rear end portion; said coils are disposed between the lower magnetic pole main layer and the upper magnetic pole; said non-magnetic insulating layer is filled among the coils, the lower magnetic pole main layer and the upper magnetic pole; the lower magnetic pole front end portion has a width in the track width direction smaller than the width of the lower magnetic pole main layer and has, at the upper magnetic pole side, a projection step portion having a width in a floating surface almost equal to the track width; the upper magnetic pole consists of an upper magnetic pole front end layer, an upper magnetic pole rear end layer, and an upper magnetic pole top layer; and a surface for defining a gap depth of said lower magnetic pole front end portion is formed almost perpendicular to the

recording gap surface, so that the height of said lower magnetic pole front end portion in the medium running direction is 0.3 μm to 2 μm.

2. The thin film head according to claim 1, wherein the width of the lower magnetic pole front end portion in the track width direction is 1 μm to 30 μm.

3. The thin film head according to claim 1 or 2, wherein the surface other than the projection step portion of said lower magnetic pole front end portion at the upper magnetic pole side is inclined at, at least one inclination angle to the recording gap surface.

4. A thin film head comprising in combination: a reading part consisting of a magnetic shield layer and a reading element formed on a substrate; and a recording part consisting of a lower magnetic pole, an upper magnetic pole, coils, and a non-magnetic insulating layer; wherein said lower magnetic pole consists of a lower magnetic pole main layer, a lower magnetic pole front end portion, and a lower magnetic pole rear end portion; said upper magnetic pole has its front end portion opposite to the lower magnetic pole front end portion through a recording gap layer and its rear end portion connected magnetically to the lower magnetic pole rear end portion; said coils are disposed between the lower magnetic pole main layer and the upper magnetic pole; said non-magnetic insulating layer is filled among the coils, the lower magnetic pole main

layer and the upper magnetic pole; the lower magnetic pole front end portion has a width in the track width direction smaller than the width of the lower magnetic pole main layer and has, at the upper magnetic pole side, a projection step portion having a width in a floating surface almost equal to the track width and having a width in the position away from the floating surface in the head rear portion direction larger than the width of the upper magnetic pole; and a surface for defining a recording gap depth of said lower magnetic pole front end portion is formed almost perpendicular to the recording gap surface.

5. The thin film head according to any one of claims 1 to 4, wherein said upper magnetic pole front end layer has a width corresponding to the track width from the floating surface to the magnetic pole expansion position, so as to increase the width from the magnetic pole expansion position to the head rear portion direction.

6. The thin film head according to any one of claims 1 to 5, wherein said upper magnetic pole front end layer consists of a plurality of magnetic layers having different saturation magnetic flux densities, so that the magnetic layer of the recording gap side has a saturation magnetic flux density higher than that of the magnetic layer at a side farther from the recording gap.

7. The thin film head according to any one of

claims 1 to 6, wherein the saturation magnetic flux density of at least some magnetic materials for use in said upper magnetic pole front end layer or the lower magnetic pole front end portion is higher than that of the magnetic material for use in the lower magnetic pole main layer and the upper magnetic pole top layer.

8. The thin film head according to any one of claims 1 to 7, wherein the specific resistance of the magnetic material for use in the lower magnetic pole main layer or the upper magnetic pole top layer is higher than that of the magnetic material for use in the upper magnetic pole front end layer or the lower magnetic pole front end portion.

9. A producing method of the thin film head according to any one of claims 1 to 8, wherein the lower magnetic pole front end portion is produced on the lower magnetic pole main layer by a flame plating method.

10. A magnetic disk apparatus comprising: a magnetic recording medium; a motor for driving the same; a magnetic head for recording and reading onto the magnetic recording medium; a mechanism for positioning the magnetic head, a circuit system for controlling these; and a circuit system for supplying a recording signal to the magnetic head and processing a reading signal from the magnetic head; wherein at least the one thin film head according to any one of claims 1 to 9 is mounted as the magnetic head, and said magnetic

recording medium has a coercivity of 279kA/m (3500Oe) or more.